REMARKS

The present communication is responsive to the Official Action mailed June 22, 2004. A petition for a three-month extension of the term for response to said Official Action, to and including December 22, 2004, is transmitted herewith.

In response to the objection to the drawings, new sheets 1-5 of formal drawings have been submitted to replace existing sheets 1-3. Figs. 1-5 have been more widely spaced-apart on the new sheets, and accordingly, the objection should be withdrawn.

By the present amendment, claim 1 has been modified to state that the joining step includes bonding contacts on the active element to contact pads on the interconnect element "using a substantially solid-phase bonding process," as previously referred to in claim 10. Paragraphs (a) and (b) have been amended to recite the "active element contacts" and "contact pads" so as to provide antecedent basis for the recitations of claim paragraph (c).

Claim 1 was rejected under 35 U.S.C. § 102 on *Fjelstad et al.*, U.S. Patent 6,573,609 ("*Fjelstad* '609"). Reconsideration and withdrawal of this rejection are respectfully requested. As now amended, claim 1 recites that the joining step includes forming substantially rigid metal-to-metal interconnects between the active element contacts and the contact pads using a substantially solid-phase bonding process. That step is not seen in the passages of *Fjelstad* '609 relied upon in the rejection. As to Figs. 7-8 of the reference, column 19, lines 1-30 describe the use of "an electrically conductive material 282 such as conductive polymer, conductive adhesive, solder or solder paste" (lns. 8-9). Conductive polymer and conductive adhesive do not form a "substantially rigid metal-to-metal interconnect." Solder and solder paste do not

provide a "substantially solid-phase bonding process." Indeed, the '609 specification confirms that these are used in the normal manner, *i.e.*, "reflowed" (ln. 11), or melted so as to provide a bulk melt phase. Similarly, the alternative "solder bumps that are reflowable" (ln. 17) would provide bulk melting. By contrast, the term "substantially solid-phase bonding process," as used in the present disclosure, is explicitly defined (Specification, ¶ 0047) as "a bonding process, as used in the present disclosure which operates without bulk melting but which may involve formation of an interfacial liquid phase . . . ." As the reference does not meet the recitations of the claim, the § 102 rejection should be withdrawn.

Moreover, it is noted that the use of a substantially solid-phase bonding process provides particular advantages in the environment of the invention recited in claim 1. As pointed out in paragraph 0047 of the present specification, the use of a solid-phase bonding process avoids problems such as the need to confine a molten phase and short-circuiting caused by a flow of a molten phase. This advantage is particularly pronounced where, as recited in claim 1, the substantially solid-phase bonding process is applied to make bonds with contacts "exposed at a surface of said active element," *i.e.*, with the contacts of a device such as a semiconductor chip itself. As the Examiner doubtless appreciates, space is at a premium on the surface of a chip. Solid-phase bonding processes normally do not provide characteristics which would be desirable in a bond intended to connect a microelectronic element directly to a circuit panel such as a circuit board. *Inter alia*, the rigidity of the connections typically would be undesirable, in that it would result in high stresses upon differential thermal expansion of the circuit board and a substrate. However, in the environment of claim 1, the "terminals" referred to in claim paragraph (d) are available for making external connections as, for example,

to a circuit board, and these terminals are "movable with respect to said interconnect body," so that differential thermal expansion of the assembly is taken up by the relative movement of the terminals and the interconnect body. Stated another way, the rigid metal-to-metal interconnections formed by the substantially solid-phase bonding process are used in an environment where they will not be subject to substantial thermal stress.

The pertinence of Fig. 3 in *Fjelstad* '609 to the method of claim 1 is not apparent. Element 101 in Fig. 3 of the reference is a sheet-like dielectric body bearing "a plurality of resilient contacts 105." (Col. 13, lns. 19-25.) The statement in the Official Action that active microelectronic elements "may be permanently attached to 101" is correct only in that an entirely separate microelectronic element, such as a chip bearing solder balls, may be "plugged into the first socket assembly" so that solder balls on the microelectronic element engage "the resilient contacts of the test socket assembly" (col. 13, lns. 57-59) and then, after testing, either removed or permanently attached "by heating the solder balls to liquefy the solder and then resolidifying the solder." The fact that a microelectronic element may later be "permanently attached to" element 101 does not convert element 101 into "an active microelectronic element including active devices in an active element body and active element contacts exposed at a surface of said active element body . . ." as recited in claim 1. Moreover, element 101 of *Fjelstad* '609 Fig. 3 is mounted to element 101 before the entire assembly is used as a test socket or as a permanent connection socket, and hence, before a microelectronic element with active devices is ever connected to resilient contacts 105. Thus, the process of joining an interconnect element to an active element necessarily includes the step asserted by the Examiner, *i.e.*, permanently attaching a

microelectronic element to the socket formed by element 101 and resilient contacts 105. That step manifestly does not form a "substantially rigid metal-to-metal interconnect" between an active element body including active devices therein and the asserted interconnect element. As disclosed in the reference, elements 105 are "resilient." Further, that step does not use a "substantially solid-phase bonding process," but instead involves reflowing the solder balls on the microelectronic element itself.

Claim 5 was also rejected under 35 U.S.C. § 102 on *Fjelstad* '609. This claim distinguishes over the reference for the same reasons as discussed above in connection with claim 1. Claims 8-10, were also encompassed in this rejection, have been canceled by the present amendment.

Claim 12 distinguishes over *Fjelstad* '609 for the same reasons as discussed above in connection with claim 1, and further because nothing in *Fjelstad* '609 has been pointed out as teaching the specific solid-phase bonding processes referred to in claim 12, *i.e.*, "eutectic bonding or diffusion bonding."

Claims 2-4, 6-7, 11, and 13-27 inclusive were rejected under 35 U.S.C. § 103(a) on *Fjelstad* '609. The present invention and the subject matter of the *Fjelstad* '609 patent were, at the time the present invention was made, owned by the same person or subject to an obligation of assignment to Tessera, Inc. Accordingly, *Fjelstad* '609 is not available as a reference under 35 U.S.C. § 103. M.P.E.P. §§ 706.02(L)(1) and 706.02(L)(2). This point may be moot to the extent that the Official Action relies upon disclosure which was carried over from *Bellaar et al.*, U.S. Patent 6,002,168, issued in December 1999 ("*Bellaar* '168"; copy herewith), which is the "grandparent" of the *Fjelstad* '609 patent. The *Bellaar* '168 patent issued prior to the earliest filing date presently asserted by applicants. To advance prosecution, applicants have responded

herein to the § 103 rejection on the assumption that the rejection is based on the *Bellaar* '168 disclosure.

Bellaar '168 discloses only a portion of that which is set forth in the full *Fjelstad* '609 disclosure. For example, Figs. 7 and 8, and the associated disclosure in *Fjelstad* '609, are not included in *Bellaar* '168. Inasmuch as the available teachings (*Bellaar* '168) include only a subset of the teachings applied in the § 102 rejection, all of the reasons advanced above in connection with claim 1 remain applicable to distinguish claims 2-4, 6-7, 11, and 13-16, dependent from claim 1 under § 103.

The § 103 rejection should also be withdrawn as to independent claim 17. Nothing in the available teachings of *Bellaar* '168, or, for that matter, even in the unavailable teachings of *Fjelstad* '609, has been pointed out as teaching a bonding process in which bumps projecting from a first microelectronic element project into recesses on a second microelectronic element and are bonded to contact pads of the second microelectronic element disposed within the recesses using a "substantially solid-phase bonding process while urging" bodies of the two microelectronic elements "toward one another" so that at least some of said bumps, at least some of said contacts or both deform within said recesses," as recited in claim 17. An example of such a process is described at paragraphs 0045-0048 inclusive of the present specification. The Official Action does not refer to deforming bumps projecting into recesses during a solid-phase bonding process, but instead refers to "deforming the leads." (Official Action at 5, 6.) While the unavailable teachings of *Fjelstad* '609 (*e.g.*, Figs. 7A, 7B) have elements on one body 310 engaged into recesses 280 on an opposite body, the bumps are not bonded to contacts in the recess using a solid-phase bonding process. Any "deformation" occurring during the process occurs as a result of

the reflow contemplated by the reference. In short, there is nothing in the art relied upon for rejection which is seen as suggesting the process of claim 17. Claims 18-27 inclusive distinguish over the art for the same reasons. Claim 17 has been amended by the present amendment only to correct a typographical error, replacing the term "solid phase" with -- solid-phase --.

New claim 28, dependent from claim 6, has been added. This claim is supported, *inter alia*, by the disclosure at paragraph 0016 of the specification. This claim distinguishes over the art for the same reasons as advanced above in connection with claim 1.

As it is believed that all of the objections and rejections set forth in the Official Action have been fully met by the foregoing amendments and remarks, favorable reconsideration and allowance are earnestly solicited.

If, however, for any reason the Examiner does not believe that such action can be taken at this time, it is respectfully requested that she telephone applicant's attorney at (908) 654-5000 in order to overcome any additional objections which she might have.

If there are any additional charges in connection with this requested amendment, the Examiner is authorized to charge Deposit Account No. 12-1095 therefor.

Dated: December 22, 2004

Respectfully submitted,

By_____

Marcus J. Millet
Registration No.: 28,241
LERNER, DAVID, LITTENBERG,
KRUMHOLZ & MENTLIK, LLP
600 South Avenue West
Westfield, New Jersey 07090
(908) 654-5000
Attorney for Applicant

IN THE DRAWINGS

Figures 1-5 have been revised so that they are more widely spaced-apart.

Attachment: Replacement Sheets 1-5